

NR 445 Technical Advisory Group

Proposal For Control Of Emissions From Compressed-Ignition Internal Combustion Engines Combusting Fuel Oil

April 16, 2002

Caroline Garber, 608-264-9218

garbec@dnr.state.wi.us

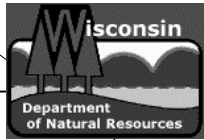
Jeff Myers, 608-266-2879

myersj @dnr.state.wi.us

Andrew Stewart, 608-266-5499

stewaa @dnr.state.wi.us

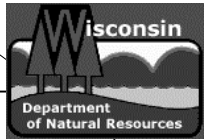
Bureau of Air Management



April 16, 2002

Purpose

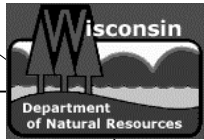
- ◆ To Lay Out & Explain Basis For Proposed Emission Limits For Existing Engines Combusting Greater Than 40,000 GPY Fuel Oil.
- ◆ Provide Additional Information On What Constitutes A Modified Engine



April 16, 2002

What Level Of PM Control Would Be Required?

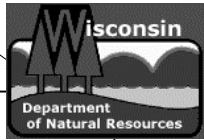
- ◆ 100-750 Hp engines
 - ◆ 0.10 g/bhp-hr
- ◆ >750 Hp engines
 - ◆ 0.03 g/bhp-hr



April 16, 2002

How Would Compliance Be Demonstrated?

- ◆ Individual Engine(s):
 - ◆ Equip with a device certified by California Air Resources Board, the US EPA, or as approved by DNR using equivalent test method
 - ◆ Submit compliance certification to the DNR



April 16, 2002

How Were The Emission Rates Chosen?

- ◆ Review of Available Information On Retrofit Technologies
 - ◆ Government Agencies
 - ◆ Control Product Manufacturers
 - ◆ Diesel Technology Organizations
 - ◆ Academic Literature
 - ◆ Industries Reliant on Diesel Technology
- ◆ Reviewed Test Results
 - ◆ California Air Resources Board
 - ◆ Manufacturers of Emission Control Association



April 16, 2002

How Were The Emission Rates Chosen?

- ◆ Levels reflect an approximate 80-90% reduction from baseline
 - ◆ Combination of low sulfur fuel & PM controls
 - ◆ Baseline established using EPA's AP-42
- ◆ Supportable by technology available today
 - ◆ Numerous examples of successful retrofit technology
 - ◆ Growing number of certified control devices



April 16, 2002

HP	Existing (lbs/hr)	75% Reduction From Baseline		90% Reduction From Baseline	
		30 ppm (lbs/hr)	g/bhp-hr	30 ppm + control (lbs/hr)	g/bhp-hr
50	0.11	0.03	0.25	0.01	0.10
100	0.22	0.06	0.25	0.02	0.10
250	0.55	0.14	0.25	0.06	0.10
500	1.10	0.28	0.25	0.11	0.10
1000	0.70	0.18	0.08	0.07	0.03
1500	1.05	0.26	0.08	0.11	0.03
2000	1.40	0.35	0.08	0.14	0.03
2500	1.75	0.44	0.08	0.18	0.03

AP-42 for industrial (less than 600 Hp) ICE (uncontrolled)

2.20E-03 lbs/bhp-hr power output

0.22 lbs/hr (100 Hp)

0.999 grams/bhp-hour

0.31 lbs/mmBTU fuel input

0.22 lbs/hr (100 Hp)

AP-42 for large (600 Hp and greater) stationary source ICE (NOx control by ignition timing retard)

7.00E-04 lbs/bhp-hr power output

0.42 lbs/hr (600 Hp)

0.318 grams/bhp-hour

0.10 lbs/mmBTU fuel input

0.42 lbs/hr (600 Hp)

1 kilowatt = 3415 btu/hour

1 horsepower = 0.7457 kilowatts

1 kilowatt = 1.341 horsepower

1 horsepower = 2547 btu/hr (**100%** efficient)

1 horsepower = 7000 btu/hr (**36%** efficient)

Fuel

140,000 btu/gal

19,200 btu/lb

7.3 lbs/gal



April 16, 2002

How Will Modifications Be Determined?

- ◆ An engine is considered to be modified, and therefore subject to BACT requirements, when:
 - ◆ A physical change or change in the method of operation results in an increase in emissions above an allowed increment (criteria pollutant specific)
- ◆ Repairing or rebuilding will not trigger a modification if it is considered to be routine maintenance or repair.
- ◆ Single repair costs exceeding 50% of new engine may be considered to be a modification.